IN THE CLAIMS:

1. – 4. (canceled)

5. (currently amended) An apparatus for monitoring a production process performed by a production machine, said apparatus comprising:

one or more sensor modules~~, at least one of said~~ including at least one ~~or more~~ sensor modules accepting an input from a linear variable differential transformer, ~~each of~~ said at least one ~~or more of~~ sensor modules including a signal conditioning circuit for conditioning said input;

one or more module slots each adapted to receive ~~one of~~ said one or more sensor modules;

a processing device ~~performing a method of~~for executing steps to monitor~~ing~~ a production process, said ~~method comprising the~~ steps including ~~of~~:

(a) calibrating the sensor module which receives input from the linear variable differential transformer by:

(a1) ~~accepting~~ receiving maximum scale information from an input device, where the maximum scale information indicates a maximum range over which ~~for~~ the linear variable differential transformer ~~input~~is to be used;

(a2) setting a gain to an initial value;

(a3) setting an offset to an initial value;

(a4) providing information to a display device to prompt a user of the apparatus to cause the linear variable differential transformer to traverse its complete range of movement;

(a5) recording a minimum voltage produced as ~~a~~ the complete range of movement of the linear variable differential transformer is traversed;

(a6) recording a maximum voltage produced as the complete range of movement of the linear variable differential transformer is traversed;

(a7) identifying a substantially linear region of operation of the linear variable differential transformer based at least in part on the recorded minimum and maximum voltages;

(a8) providing information to the display device to prompt the user to locate the linear variable differential transformer to operate at a point within the linear region of operation;

(a9) settingadjusting said offset to a substantially zero value while the linear variable differential transformer is operating at the point within the linear region of operation;

(a10) providing information to the display device to prompt the user to locate the linear variable differential transformer to operate at a maximum desired position within the linear region of operation; and

(a11) settingadjusting said gain to a known reference value while the linear variable differential transformer is operating at a the maximum desired position within the complete range of movementlinear region of operation;

(b) acquiring a stream of data from the sensor module installed in selected ones of said one or more module slots;

(c) processing the stream of data; and

(d) generating a visual presentation for the stream of data;

an interface circuit in communication between said one or more module slots and said processing device, said interface circuit converting analog signals into digital signals and digital signals into analog signals;

a said display device in communication with said processing device, said display device displaying said visual presentation in a human readable format;

a gain control circuit in communication responsive towith said processing device and in communication with said signal conditioning circuit in each of said one or more sensor modules, said gain control circuit for amplifying the stream of datainput from the linear variable differential transformer according to the gain set by the processing devicesensor module installed in selected ones of said one or more module slots;

an offset control circuit responsive toin communication with said processing device and in communication with said signal conditioning circuit in each of said one or more sensor modules, said offset control circuit for applying a dc voltage offset to the stream of datainput

from the linear variable differential transformer according to the offset set by the processing device~~sensor module installed in selected ones of said one or more module slots~~;

~~a latch control circuit responsive to said processing device and in communication with said signal conditioning circuit in each of said one or more sensor modules, said latch control circuit holding values of the stream of data from the sensor module installed in selected ones of said one or more module slots;~~

~~an~~ the input device in communication with said processing device, said input device accepting commands from ~~a~~ the user thereby allowing the user to control said processing device; and

a storage device in communication with said processing device, said storage device for storing ~~said~~ data for later recall.

6. (withdrawn) An apparatus for monitoring a production process performed by a production machine, said apparatus comprising:

a plurality of module slots for receiving sensor modules of various types;

a processing device performing a method of monitoring the production process, said method comprising the steps of:

(a) identifying the type of sensor module installed in each of said plurality of module slots;

(b) calibrating the sensor module installed in each of said plurality of module slots;

(c) acquiring a stream of data from the sensor module installed in selected ones of said plurality of module slots;

(d) processing the stream of data;

(e) generating a visual presentation for the stream of data;

an interface circuit in communication between said plurality of module slots and said processing device, said interface circuit converting analog signals into digital signals and digital signals into analog signals;

a display device in communication with said processing device, said display device displaying said visual presentation in a human readable format;

an input device in communication with said processing device, said input device accepting commands from a user to control said processing device.

7. (withdrawn) The apparatus of Claim 6 further comprising a switching circuit in communication with said plurality of modules slots. said switching circuit adapted to split the input from one of said plurality of sensor modules into a first signal and a second signal, said switching circuit passing said second signal to another of said plurality of sensor modules, wherein said first signal and second signal are processed independently.

8. (withdrawn) The apparatus of Claim 6 further comprising a plurality of sensor modules installed in said module slots, each of said plurality of sensor modules accepting an input from a sensor selected from the group consisting of a linear variable differential transformer, a slide encoder, a current loop, a dc voltage sensor, a differential voltage sensor, a piezoelectric vibration sensor, and a power sensor, each of said plurality of sensor modules including a signal conditioning circuit.

9. (withdrawn) The apparatus of Claim 8 further comprising a gain control circuit in communication with said signal conditioning circuit of each said plurality of sensors modules and responsive to said processing device, said gain control circuit amplifying the stream of data from the sensor module installed in selected ones of said plurality of module slots.

10. (withdrawn) The apparatus of Claim 8 wherein said signal conditioning electronics have a first calibration range associated with the sensor and a second calibration range associated with said sensor, said first calibration range being wider than said second calibration value, said first calibration value being used for data acquisition and said second calibration value being used for data display.

11. (withdrawn) The apparatus of Claim 6 further comprising an offset control circuit in communication with said signal conditioning circuit of each said plurality of sensors modules and responsive to said processing device, said offset control circuit applying a dc voltage offset to the stream of data from the sensor module installed in selected ones of said plurality of module slots.

12. (withdrawn) The apparatus of Claim 6 further comprising a latch control circuit in communication with said signal conditioning circuit of each said plurality of sensors modules and

responsive to said processing device, said latch control circuit holding a value of the stream of data from the sensor module installed in selected ones of said plurality of module slots.

13. (withdrawn) The apparatus of Claim 6 further comprising an input device allowing user control of said process device.

14. (withdrawn) The apparatus of Claim 6 further comprising a machine interface in communication with the processing device and a control circuit of the production machine having control over various process parameters, wherein said processing device accepts commands from said input device and generates control signals transmitted through said machine interface thereby allowing a user to adjust the various process parameters of the production machine.

15 – 16. (canceled)

17. (currently amended) An automated method of monitoring a production process using a hardware monitoring device operated by a user, said method comprising the steps of:

(a) identifying one or more sensor modules installed in ~~a~~ the hardware monitoring device, wherein at least one of the one or more sensor modules receives input from a linear variable differential transformer;

(b) calibrating the at least one sensor module which receives input from the linear variable differential transformer by:

(b1) ~~accepting~~ receiving maximum scale information entered by the user using the hardware monitoring device, where the maximum scale information indicates a maximum range over which ~~for~~ the linear variable differential transformer ~~input~~is to be used;

(b2) setting a gain to an initial value;

(b3) setting an offset to an initial value;

(b4) displaying information to prompt the user to cause the linear variable differential transformer to traverse its complete range of movement;

(b5) recording a minimum voltage produced as ~~a~~ the complete range of movement of the linear variable differential transformer is traversed;

(b6) recording a maximum voltage produced as the complete range of movement of the linear variable differential transformer is traversed;

(b7) identifying a substantially linear region of operation of the linear variable differential transformer based at least in part on the recorded minimum and maximum voltages;

(b8) displaying information to prompt the user to locate the linear variable differential transformer to operate at a point within the linear region of operation;

(b9) settingadjusting said offset to a substantially zero value while the linear variable differential transformer is operating at the point within the linear region of operation; and

(b10) displaying information to prompt the user to locate the linear variable differential transformer to operate at a maximum desired position within the linear region of operation;

(b11) adjusting setting said gain to a known reference value while the linear variable differential transformer is operating at a the maximum desired position within the complete range of movementlinear region of operation;

(c) acquiring data from the one or more sensor modules;

(d) processing the data acquired from the one or more sensor modules; and

(e) generating a visual presentation from the data acquired from the one or more sensor modules.

18. (withdrawn) A method of monitoring a production process using a hardware monitoring device having at least one sensor module installed therein, the method comprising the steps of:

(a) acquiring sensor data using the at least one sensor module;

(b) splitting the sensor data from the at least one sensor module into a first signal and a second signal;

(c) processing the first and second signals independently; and

(d) generating a visual representation of the first and second signals substantially simultaneously on a display device.

19. (withdrawn) The method of claim 18 wherein

step (c) further comprises processing the first signal at a first amplitude scale and the second signal at a second amplitude scale that is different from the first amplitude scale; and

step (d) further comprises generating the visual representation of the first signal at the first amplitude scale and generating the visual representation of the second signal at the second amplitude scale.

20. (withdrawn) The method of claim 18 wherein

step (c) further comprises processing the first signal at a first time scale and the second signal at a second time scale that is different from the first time scale; and

step (d) further comprises generating the visual representation of the first signal at the first time scale and generating the visual representation of the second signal at the second time scale.

21. (withdrawn) The method of claim 18 further comprising calibrating the at least one sensor module at a first calibration range for the first signal and a second calibration range for the second signal, where the first calibration range is different from the second calibration range.

22. (withdrawn) The method of claim 18 further comprising:

(e) monitoring the sensor data to detect interruptions in acquisition of the sensor data ;

(f) generating an alert signal upon detection of an interruption in the acquisition of the sensor data; and

(g) pausing processing of the sensor data upon detection of an interruption in the acquisition of the sensor data.

23. (withdrawn) An apparatus for monitoring a production process performed by a production machine, said apparatus comprising:

at least one sensor module for generating sensor signals related to the production process;

a switching circuit in communication with the at least one sensor module, the switching circuit for splitting the sensor signals into a first signal and a second signal;

a processing device in communication with the switching circuit for receiving and processing the first and second signals independently;

a display device for generating a visual representation of the first and second signals; and

an input device in communication with the processing device, the input device for accepting commands from a user to control the processing device to selectively modify the visual representation of the first and second signals on the display device.

24. (withdrawn) The apparatus of claim 23 wherein

the processing device processes the first signal at a first amplitude scale and the second signal at a second amplitude scale that is different from the first amplitude scale, and

the display device generates the visual representation of the first signal at the first amplitude scale and generates the visual representation of the second signal at the second amplitude scale.

25. (withdrawn) The apparatus of claim 23 wherein

the processing device processes the first signal at a first time scale and the second signal at a second time scale that is different from the first time scale, and

the display device generates the visual representation of the first signal at the first time scale and generates the visual representation of the second signal at the second time scale.

26. (withdrawn) The apparatus of claim 23 wherein the display device generates a graphic overlay of the first and second signals.

27. (currently amended) An automated method of monitoring a production process using a hardware monitoring apparatus operated by a user, the hardware monitoring apparatus having a processing device, a display device ~~one or more sensors selected from the group consisting of a dc sensor, a differential sensor, a current sensor~~ and a position sensor, the method comprising:

(a) ~~entering~~ receiving maximum scale information at the processing device as entered by the user, where the maximum scale information indicates a maximum range over which ~~for~~ the ~~one or more of the~~position sensors is to be used;

(b) automatically setting a gain to an initial value for the ~~one or more of the~~position sensors based on operations performed by the processing device;

(c) automatically setting an offset to an initial value for the ~~one or more of the~~position sensors based on operations performed by the processing device;

(d) upon completion of steps (b) and (c), automatically displaying information on the display device to prompt the user to cause the position sensor to traverse its complete range of movement;

(~~d~~e) recording a minimum voltage produced by the position sensor as ~~a~~ the complete range of movement of the position sensor is traversed, the recording performed automatically based on operations performed by the processing device;

(~~e~~f) recording a maximum voltage produced by the position sensor as the complete range of movement of the position sensor is traversed, the recording performed automatically based on operations performed by the processing device;

(~~f~~g) identifying a substantially linear region of operation of the position sensor based at least in part on the recorded minimum and maximum voltages, the identifying performed automatically based on operations performed by the processing device;

(h) automatically displaying information on the display device to prompt the user to locate the position sensor to operate at a point within the linear region of operation;

(~~g~~i) ~~adjusting~~ setting the offset to a substantially zero value while the position sensor is operating at the point within the linear region of operation, the setting performed automatically based on operations performed by the processing device;

(j) automatically displaying information on the display device to prompt the user to locate the position sensor to operate at a maximum desired position within the linear region of operation; and

(~~h~~k) ~~adjusting~~ setting the gain to a known reference value while the position sensor is operating at ~~a~~ the maximum desired position within the ~~complete range~~linear region of ~~movement~~operation, the setting performed automatically based on operations performed by the processing device.

28. (currently amended) The method of claim 27 wherein step (a) further comprises:

(a1) entering the maximum linear travel of the position sensor in units of ~~length~~distance; and

(a2) entering a value in units of voltage corresponding to a position of ~~the~~ maximum linear travel of the position sensor within a calibrated full-scale range ~~in units of voltage~~.

29. (currently amended) The method of claim 27 wherein:

step (c) further comprises setting the offset to zero; and

step (b) further comprises setting the gain so that the maximum voltage produced by ~~each of~~ the position sensors is substantially equivalent to ~~a~~ the known reference value.

30. (previously presented) The method of claim 27 wherein the position sensor is selected from the group consisting of a slide encoder and a linear variable differential transformer.

31. (withdrawn) A method of monitoring a production process using a hardware monitoring device having at least one sensor module installed therein, the method comprising the steps of:

(a) calibrating the at least one sensor module over a first amplitude range;

(b) acquiring sensor data using the at least one sensor module over the first amplitude range; and

(c) generating a visual representation of the sensor data on a display device, wherein the visual representation is over a second amplitude range that is less than or greater than the first amplitude range,

wherein steps (b) and (c) are performed substantially simultaneously.

32. (withdrawn) A method of monitoring a production process using a hardware monitoring device having at least one sensor module installed therein, the method comprising the steps of:

(a) acquiring sensor data using the at least one sensor module;

(b) generating a first visual representation of the sensor data on a display device, wherein the first visual representation has a first time scale;

(c) generating a second visual representation of the sensor data on the display device, wherein the second visual representation has a second time scale that is different from the first time scale; and

(d) switching from the first visual representation to the second visual representation on the display device while continuously performing step (a).

33. (withdrawn) A method of monitoring a production process using a hardware monitoring device having a plurality of sensor module slots for receiving a plurality of sensor modules, the method comprising the steps of:

(a) installing one or more of the sensor modules in corresponding ones of the sensor module slots;

(b) sensing a module identification voltage provided by one of the sensor modules;

(c) accessing a look-up table that associates the module identification voltage to a specific type of sensor module;

(d) determining the type of sensor module based at least in part on step (c); and

(e) repeating steps (b), (c) and (d) until the type of each of the sensor modules installed in step (a) is identified.

34. (withdrawn) The apparatus of claim 6 wherein:

the display device has a display range bounded by a maximum display amplitude and a minimum display amplitude;

the processing device further for applying an amplitude offset to the visual presentation to maintain the displayed stream of data between the maximum and minimum display amplitudes of the display device; and

the input device further for accepting a command from the user to prompt the processing device to apply the amplitude offset.

35. (withdrawn) The apparatus of claim 6 wherein:

the display device has a display range bounded by a maximum display amplitude and a minimum display amplitude;

the input device further for accepting input from the user to set a maximum value for the maximum display amplitude and a minimum value for the minimum display amplitude; and

the processing device further for automatically applying an amplitude offset to the visual presentation to continuously maintain the displayed stream of data between the maximum value and the minimum value.

36. (cancelled)

37. (withdrawn) An apparatus for monitoring a production process performed by a production machine, said apparatus comprising:

one or more module slots for receiving one or more sensor modules of various types;

a processing device performing a method of monitoring the production process, said method comprising the steps of:

(a) identifying the type of sensor module installed in each of said one or more module slots;

(b) calibrating the sensor module installed in each of said one or more module slots;

(c) acquiring a stream of data from the sensor module installed in selected ones of said one or more module slots;

(d) processing the stream of data;

(e) generating a visual presentation for the stream of data;

an interface circuit in communication between said one or more module slots and said processing device, said interface circuit converting analog signals into digital signals and digital signals into analog signals;

a display device in communication with said processing device, said display device displaying said visual presentation in a human readable format; and

an input device in communication with said processing device, said input device accepting commands from a user to control said processing device.

38. (withdrawn) The apparatus of Claim 37 further comprising a switching circuit in communication with said one or more modules slots, said switching circuit adapted to split the input from one of said one or more sensor modules into a first signal and a second signal, said switching circuit passing said second signal to another of said one or more sensor modules, wherein said first signal and second signal are processed independently.

39. (withdrawn) The apparatus of Claim 37 further comprising one or more sensor modules installed in said module slots, each of said one or more sensor modules accepting an input from a sensor selected from the group consisting of a linear variable differential transformer, a slide encoder, a current loop, a dc voltage sensor, a differential voltage sensor, a piezoelectric vibration sensor, and a power sensor, each of said one or more sensor modules including a signal conditioning circuit.

40. (withdrawn) The apparatus of Claim 39 further comprising a gain control circuit in communication with said signal conditioning circuit of each said one or more sensors modules and responsive to said processing device, said gain control circuit amplifying the stream of data from the sensor module installed in selected ones of said one or more module slots.

41. (withdrawn) The apparatus of Claim 39 wherein said signal conditioning electronics have a first calibration range associated with the sensor and a second calibration range associated

with said sensor, said first calibration range being wider than said second calibration value, said first calibration value being used for data acquisition and said second calibration value being used for data display.

42. (withdrawn) The apparatus of Claim 37 further comprising an offset control circuit in communication with said signal conditioning circuit of each said one or more sensors modules and responsive to said processing device, said offset control circuit applying a dc voltage offset to the stream of data from the sensor module installed in selected ones of said one or more module slots.

43. (withdrawn) The apparatus of Claim 37 further comprising a latch control circuit in communication with said signal conditioning circuit of each said one or more sensor modules and responsive to said processing device, said latch control circuit holding a value of the stream of data from the sensor module installed in selected ones of said one or more module slots.

44. (withdrawn) The apparatus of Claim 37 further comprising an input device allowing user control of said process device.

45. (withdrawn) The apparatus of Claim 37 further comprising a machine interface in communication with the processing device and a control circuit of the production machine having control over various process parameters, wherein said processing device accepts commands from said input device and generates control signals transmitted through said machine interface thereby allowing a user to adjust the various process parameters of the production machine.

46. (withdrawn) The apparatus of claim 37 wherein:

the display device has a display range bounded by a maximum display amplitude value and a minimum display amplitude value;

the processing device further for applying an amplitude offset to the visual presentation to maintain the displayed stream of data between the maximum and minimum display amplitude values of the display device; and

the input device further for accepting a command from the user to prompt the processing device to apply the amplitude offset.

47. (withdrawn) The apparatus of claim 37 wherein:

the display device has a display range bounded by a maximum display amplitude and a minimum display amplitude;

the input device further for accepting input from the user to set a maximum value for the maximum display amplitude and a minimum value for the minimum display amplitude; and

the processing device further for applying an amplitude offset to the visual presentation to continuously maintain the displayed stream of data between the maximum value and the minimum value.

48. (withdrawn) A method of monitoring a production process using a hardware monitoring device having at least one sensor module installed therein, the method comprising the steps of:

(a) acquiring sensor data using the at least one sensor module;

(b) splitting the sensor data from the at least one sensor module into a first signal and a second signal;

(c) processing the first and second signals independently; and

(d) generating a visual representation of the first and second signals substantially simultaneously on a display device.

49. (withdrawn) The method of claim 48 wherein

step (c) further comprises processing the first signal at a first amplitude scale and the second signal at a second amplitude scale that is different from the first amplitude scale; and

step (d) further comprises generating the visual representation of the first signal at the first amplitude scale and generating the visual representation of the second signal at the second amplitude scale.

50. (withdrawn) The method of claim 48 wherein

step (c) further comprises processing the first signal at a first time scale and the second signal at a second time scale that is different from the first time scale; and

step (d) further comprises generating the visual representation of the first signal at the first time scale and generating the visual representation of the second signal at the second time scale.

51. (withdrawn) The method of claim 48 further comprising calibrating the at least one sensor module at a first calibration range for the first signal and a second calibration range for the second signal, where the first calibration range is different from the second calibration range.

52. (withdrawn) The method of claim 48 further comprising:

(e) monitoring the sensor data to detect interruptions in acquisition of the sensor data ;

(f) generating an alert signal upon detection of an interruption in the acquisition of the sensor data; and

(g) pausing processing of the sensor data upon detection of an interruption in the acquisition of the sensor data.

53. (withdrawn) An apparatus for monitoring a production process performed by a production machine, said apparatus comprising:

at least one sensor module for generating sensor signals related to the production process;

a switching circuit in communication with the at least one sensor module, the switching circuit for splitting the sensor signals into a first signal and a second signal;

a processing device in communication with the switching circuit for receiving and processing the first and second signals independently;

a display device for generating a visual representation of the first and second signals; and

an input device in communication with the processing device, the input device for accepting commands from a user to control the processing device to selectively modify the visual representation of the first and second signals on the display device.

54. (withdrawn) The apparatus of claim 53 wherein

the processing device processes the first signal at a first amplitude scale and the second signal at a second amplitude scale that is different from the first amplitude scale, and

the display device generates the visual representation of the first signal at the first amplitude scale and generates the visual representation of the second signal at the second amplitude scale.

55. (withdrawn) The apparatus of claim 53 wherein

the processing device processes the first signal at a first time scale and the second signal at a second time scale that is different from the first time scale, and

the display device generates the visual representation of the first signal at the first time scale and generates the visual representation of the second signal at the second time scale.

56. (withdrawn) The apparatus of claim 53 wherein the display device generates a graphic overlay of the first and second signals.

57. – 60. (cancelled)

61. (withdrawn) A method of monitoring a production process using a hardware monitoring device having at least one sensor module installed therein, the method comprising the steps of:

(a) calibrating the at least one sensor module over a first amplitude range;

(b) acquiring sensor data using the at least one sensor module over the first amplitude range; and

(c) generating a visual representation of the sensor data on a display device, wherein the visual representation is over a second amplitude range that is less than or greater than the first amplitude range,

wherein steps (b) and (c) are performed substantially simultaneously.

62. (withdrawn) A method of monitoring a production process using a hardware monitoring device having at least one sensor module installed therein, the method comprising the steps of:

(a) acquiring sensor data using the at least one sensor module;

(b) generating a first visual representation of the sensor data on a display device, wherein the first visual representation has a first time scale;

(c) generating a second visual representation of the sensor data on the display device, wherein the second visual representation has a second time scale that is different from the first time scale; and

(d) switching from the first visual representation to the second visual representation on the display device while continuously performing step (a).

63. (withdrawn) A method of monitoring a production process using a hardware monitoring device having one or more sensor module slots for receiving one or more sensor modules, the method comprising the steps of:

(a) installing the one or more sensor modules in corresponding ones of the one or more sensor module slots;

(b) sensing a module identification voltage provided by one of the sensor modules;

(c) accessing a look-up table that associates the module identification voltage to a specific type of sensor module;

(d) determining the type of sensor module based at least in part on step (c); and

(e) repeating steps (b), (c) and (d) until the type of each of the one or more sensor modules installed in step (a) is identified.

64. (new) An automated method of monitoring a production process using a hardware monitoring apparatus operated by a user, the hardware monitoring apparatus having a processing device, a display device and a dc voltage sensor, the method comprising:

(a) receiving maximum scale information at the processing device as entered by the user, where the maximum scale information corresponds with a voltage range over which the dc voltage sensor is to be used;

(b) determining a reference voltage measured by the dc voltage sensor, the determining performed automatically based on operations performed by the processing device;

(c) comparing the measured reference voltage to the voltage range of the dc voltage sensor, the comparing performed automatically based on operations performed by the processing device;

(d) applying gain as necessary to bring the measured reference voltage within the voltage range of the dc voltage sensor, the applying performed automatically based on operations performed by the processing device;

(e) determining whether the measured reference voltage is within the voltage range of the dc voltage sensor, the determining performed automatically based on operations performed by the processing device; and

(f) if the measured reference voltage is not within the voltage range of the dc voltage sensor, automatically displaying information on the display device to notify the user of a calibration failure.

65. (new) An automated method of monitoring a production process using a hardware monitoring apparatus operated by a user, the hardware monitoring apparatus having a processing device, a display device and a differential voltage sensor, the method comprising:

(a) receiving scale information at the processing device as entered by the user, where the scale information corresponds with a voltage range over which the differential voltage sensor is to be used;

(b) receiving unit information at the processing device as entered by the user, where the unit information indicates units of measure corresponding to the voltage range, where the units of measure are entered by the user based on a measurement application for which the differential voltage sensor is to be used;

(c) reading a minimum differential sensor voltage from a configuration file, the reading performed automatically based on operations performed by the processing device;

(d) generating an input voltage on the differential voltage sensor which is substantially equivalent to the minimum differential sensor voltage, the generating performed automatically based on operations performed by the processing device;

(e) adjusting an offset setting to null the output of the differential voltage sensor while the input voltage is substantially equivalent to the minimum differential sensor voltage, the adjusting performed automatically based on operations performed by the processing device;

(f) calculating the differential voltage while the output of the differential voltage sensor is nulled, the calculating performed automatically based on operations performed by the processing device:

(g) generating the differential voltage calculated at step (d), the generating performed automatically based on operations performed by the processing device;

(h) adjusting a gain setting until the differential voltage is substantially equivalent to a known reference voltage, the adjusting performed automatically based on operations performed by the processing device;

(i) determining whether the gain setting can be adjusted to make the differential voltage substantially equivalent to the reference voltage, the determining performed automatically based on operations performed by the processing device; and

(j) if the gain setting cannot be adjusted to make the differential voltage substantially equivalent to the reference voltage, automatically displaying information on the display device to notify the user of a calibration failure.

66. (new) An automated method of monitoring a production process using a hardware monitoring apparatus operated by a user, the hardware monitoring apparatus having a processing device, a display device and a current sensor, the method comprising:

(a) receiving maximum scale information at the processing device as entered by the user, where the maximum scale information corresponds with a current range over which the current sensor is to be used;

(b) measuring an input current value using the current sensor, the measuring performed automatically based on operations performed by the processing device;

(c) converting the input current value to a voltage value, the converting performed automatically based on operations performed by the processing device;

(d) adjusting an offset setting to null the voltage value, the adjusting performed automatically based on operations performed by the processing device;

(e) generating a differential voltage based on the nulled voltage value, the generating performed automatically based on operations performed by the processing device;

(f) adjusting a gain setting until the differential voltage is substantially equivalent to a known reference voltage, the adjusting performed automatically based on operations performed by the processing device;

(g) determining whether the gain setting can be adjusted to make the differential voltage substantially equivalent to the reference voltage, the determining performed automatically based on operations performed by the processing device; and

(h) if the gain setting cannot be adjusted to make the differential voltage substantially equivalent to the reference voltage, automatically displaying information on the display device to notify the user of a calibration failure.